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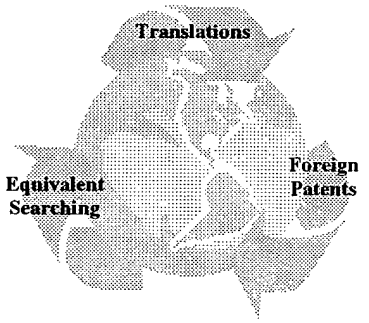

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OFFENLEGUNGSSCHRIFT
DE 197 32 285 A1

IPC: E 21 D 5/016
Date of application: July 26, 1997
Date the 'offenlegungsschrift' was laid open to public inspection: January 28, 1999
Applicant: Rudolf Seiz
Inventor: the same as the applicant
[Title in German of the object of the invention:]
Vollwandrippenträger für den Strecken- und Tunnelausbau

SOLID-WEB RIBBED SECTION FOR THE GALLERY- AND TUNNEL-SUPPORT

(54) Support profile for the gallery- and tunnel-support, whose shell or hull is made of pneumatically applied concrete *[*Translator's note: Also known as 'cement, injected in accordance with the torcrete method; gunite; shotcrete; jetcrete; gunned concrete; air-placed concrete], into which shell the support profile is embedded. The support profile has a Y-shaped cross-sectional area, whose Y-shaped web flange (6) points to the tunnel pipe, and whose Y-shaped arm-flange (1) points to the rock surface. On the Y-shaped web flange,an elliptical longitudinal bead (2) passes along the

edge-side. On the surface, facing the tunnel-side, the profile is provided with transverse ribs (4).

The included [generating] angle of the arm-flange (1) can be selected in a stepless or continuous manner between 90° and 180°. At 180°, there originates a T-shaped profile, having a straight flange, Fig. 2.

The injection blind-spot (7), which originates between the rock surface (5) and the profile, and whose size depends upon the selection of the opening [generating] angle, can be used for draining, or for grouting under pressure.

*

* *

* *

The invention pertains to support girders for the gallery- and tunnel-support in accordance with the kinds, specified in the preambles of claims 1, 2 and 3. For the support of tunnel and mine galleries, withstanding the performance tests, welded lattice trusses [lattice girders] as well as solid-web girders are used as safety support whereby the lattice trusses are concurrently used as reinforcement as a result of their bonding effect with the pneumatically applied concrete [gunite].

In contradistinction thereto, the solid-web girders do not enter into any bond with the pneumatically applied concrete,

contingent upon pronounced formation of injection blind-spots, and as a consequence thereof, also upon small static-friction surfaces, and, therefore, are not suitable to support the semirigid shell of the first of all still 'young' gunite, as far as its load-bearing capacity is concerned.

For example, such a solid-web girder is described in the German patent specification DE 196 20 290 C1. Taking a machine-drifted [machine-cut] tunnel cross-section as point of departure, the Y-shaped profile, which is represented there, is so designed that it comes in contact with the rock mass, respectively, and, therewith, should directly absorb the rock pressure [the weight of the ground] from the rock mass, without the use of a gunned concrete shell.

Contingent upon the pronouncedly different values of the Young's modulus of elasticity "steel to gunite", the Y-shaped profile absorbs the pressure of the rock mass.

The Y-shaped flanges are directed towards the tunnel tube. The included [generating] angle of the arm flange of at least 90° leads to the formation of considerable injection blind-spots in the root-area, on the outer side. As a result of this, the static-friction areas are significantly reduced so that a support effect cannot be built up between the Y-shaped girder and the pneumatically applied concrete.

Other support profiles, known from the mining practice, such as trough section profiles, GI-profiles, and wide-flange

profiles, are unsatisfactory as far as their mode of operation in the tunnel support is concerned, when gunite is used, due to the pronounced formation of injection blind-spots.

The objective to create a solid-web girder in such a way that its shaping extensively prevents the occurrence of injection blind-spots on the inner side of the tunnel, formation the basis the proposed invention. Another task consists in the increasing of the static friction in these zones, which are free of injection blind spots.

The area between girder and rock mass [ground] should be shaped in such a way that the injection blind-spot, which occurs there, can either be used for the draining of the tunnel, or - when this is not necessary - it is grouted.

As a result of this, the usually water-permeable kerf [parting line] in the profile area is prevented.

Two exemplified embodiments of the inventive concept are elucidated as follows by means of the drawings wherein

Fig. 1 is a Y-shaped solid-web girder, in the case of which the web-flange (6) is arranged, as facing the gallery tube. On the side of the edge, on this web flange (6), there passes an elliptical to circular bead (2).

The arm flanges (1) of the girder point towards the rock mass (5), and, e.g., have an included [generating] angle of 90°.

On the surfaces of the Y-shaped profiled, which is on the side of the gallery, there are arranged ribs (4).

Fig. 2 is a girder, designed as a T-shaped girder, which originates as a result of the fact that the arm flanges (1) have an angle (3) of 180°.

Fig. 3 shows a side view and a section A-A of the girder, depicted in Fig. 2

The ribs, diagrammatically represented in section A - A, are rounded off.

Patent Claims

1. Support profile for the tunnel- and gallery-support, whose supporting or bearing shell is made of pneumatically applied concrete [gunite], into which the supporting profile is embedded, **characterized in that** the support profile has a Y-shaped profile cross-section whereby the Y-shaped web flange (6) faces the tunnel-tube, respectively the gallery-tube, while the Y-shaped arm flanges (1) point towards the rock mass (5), that on the flanges (1, 6), at least, however, on the web flange, the profile has beads (2), longitudinally passing along the side of the edge.

2. Support profile, as claimed in claim 1, characterized in that the bead (2), longitudinally passing on the web flange, has an elliptically to circularly-shaped cross-section.

3. Support profile, as claimed in claims 1 and 2, characterized in that the Y-shaped arm-flanges (1) conclude an

angle, which can optionally be selected as stepless or continuous, between 180° and 90°.

4. Support profile, as claimed in claim 3, characterized in that the depth of the trough, originating between the rock mass (5) and the profile, can be determined by the selection of the angle.

5. Support profile, as claimed in claims 1 thru 3, characterized in that on the profile side, facing the rock mass, there are arranged transverse ribs (4), which continuously run around.

6. Support profile, as claimed in claim 5, characterized in that these transverse ribs (4) have the shape of a circular segment.

7. Support profile, as claimed in claims 5 and 6, characterized in that the rib interval *a* can variably be selected between the rib interval *a*, equal to the rib-width *b*, and the rib interval *a*, equal to 5-times the width of the rib.

US Department of Commerce/USPTO/STIC/Translations Branch
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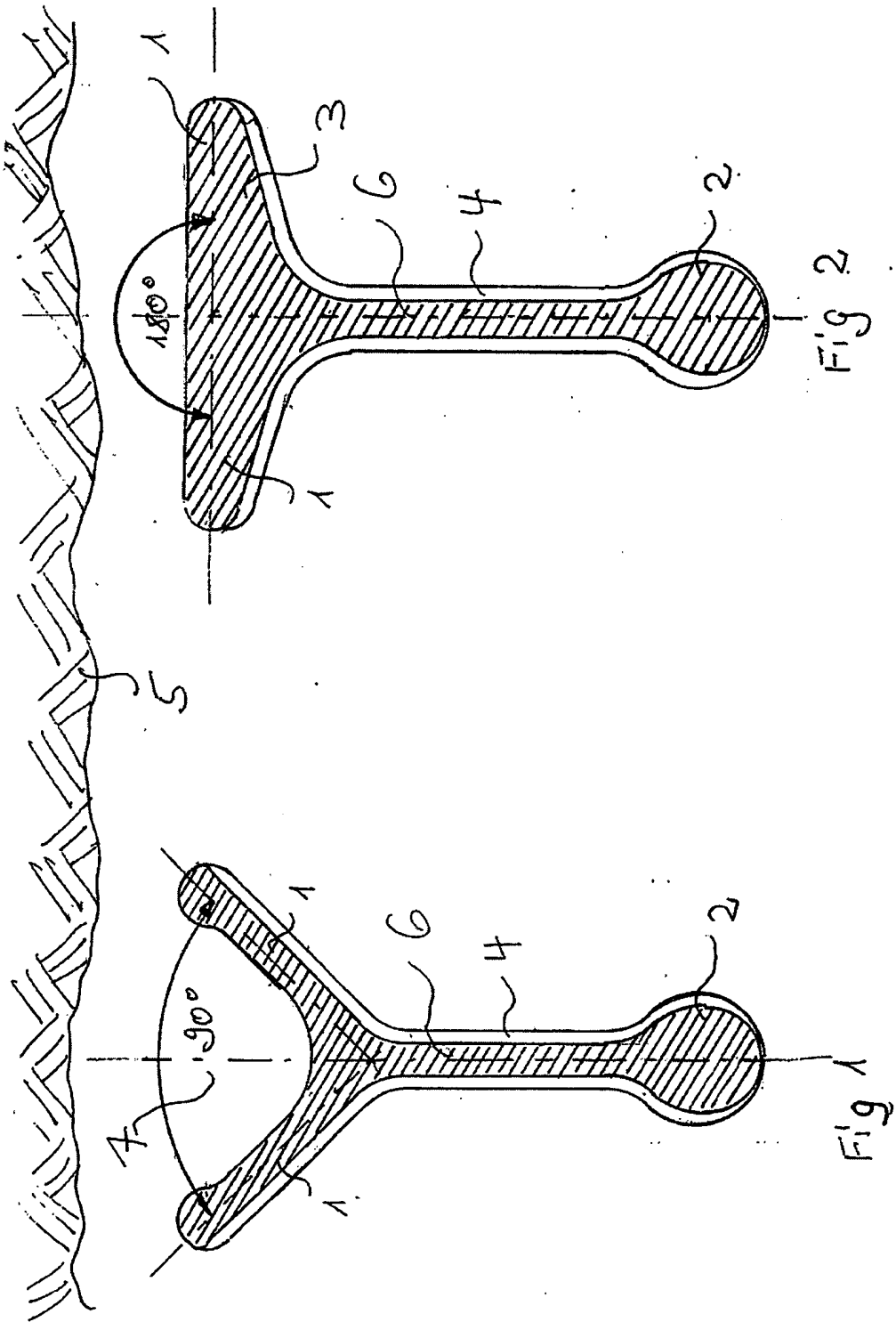

Fig 2

Fig 1

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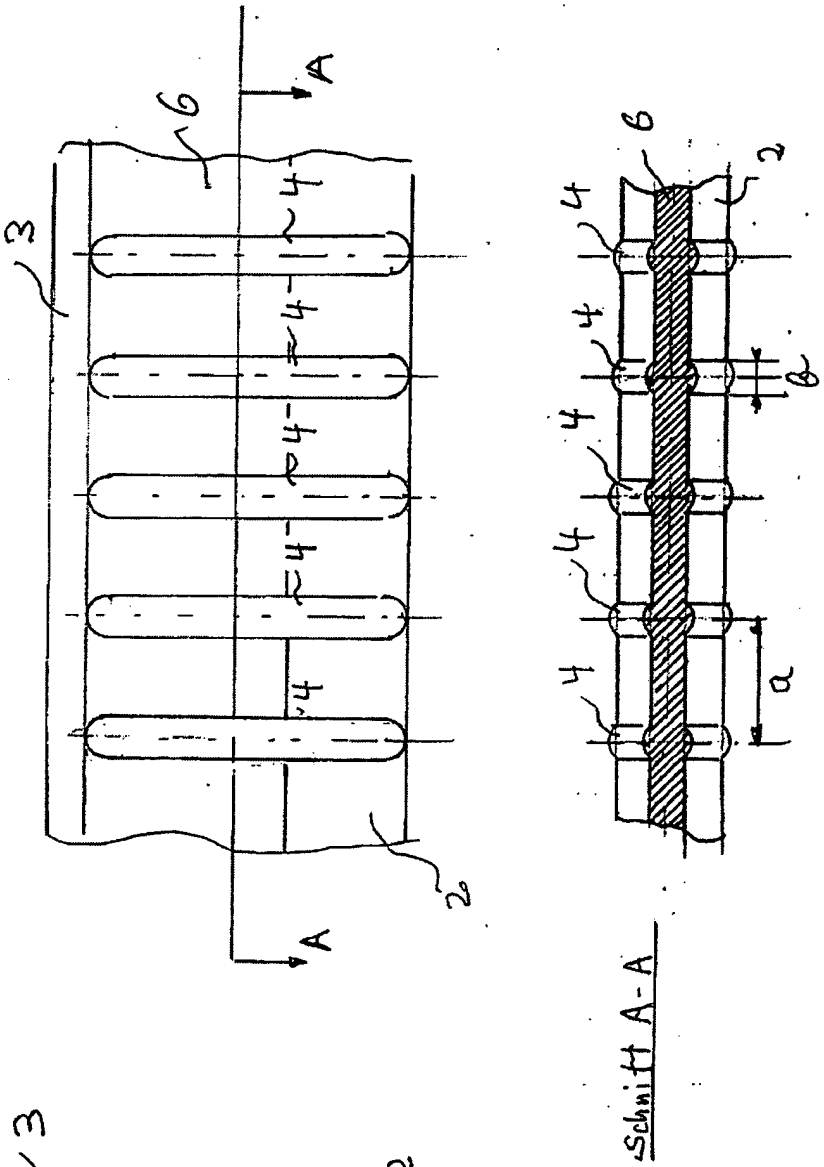

Fig 3

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